

Prepared at the Request of: Georgia-Pacific LLC Crossett, Arkansas

Prepared for the

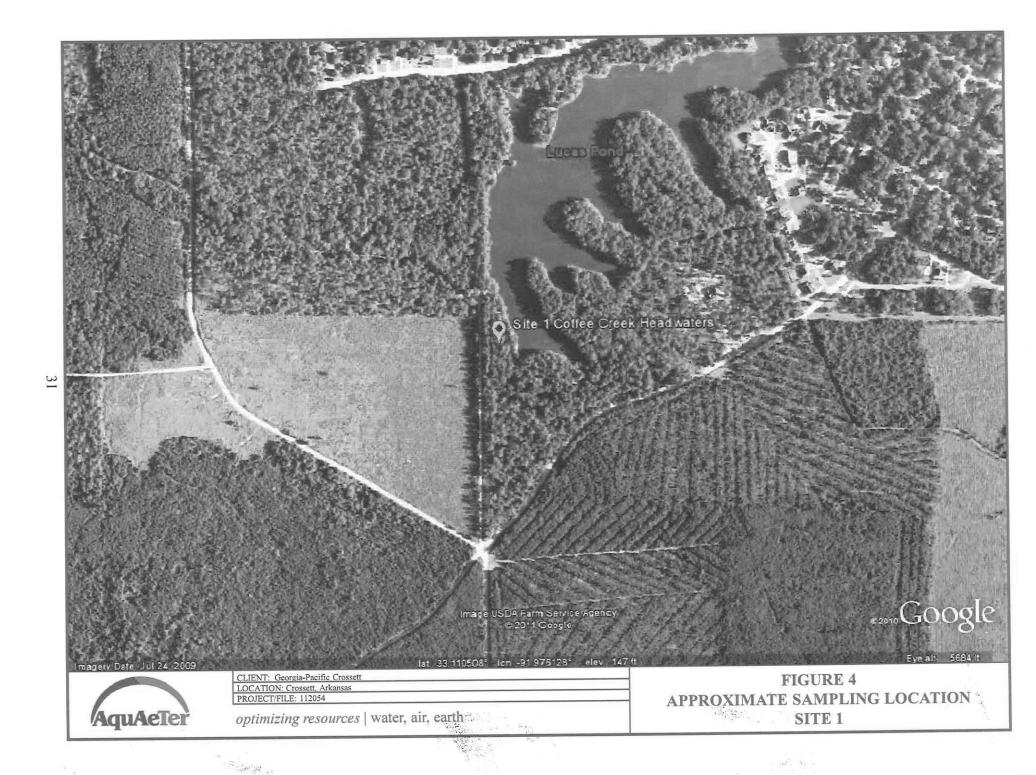
Arkansas Department of Environmental Quality Little Rock, Arkansas

Prepared by:

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> AquAeTer, Inc. Brentwood, Tennessee

> > November 2013



# A Story of Water for Crossett Pulp and Paper Mills

By RAMON GREENWOOD

Director of Public Relations
The Crossett Company, Crossett, Arkansas

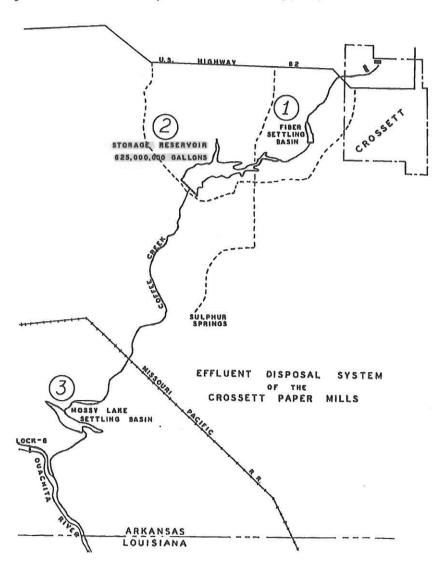
Water is perhaps the most necessary one of nature's many lavish bounties enjoyed by man. Without water, life would be a great deal different than we know it today—if life could exist at all.

Water means food, power, transportation, industry, recreation.

Americans drink more than 40 million gallons each day. The entire national requirement averages 170 billion gallons of water each 24 hour period. For each glass we drink, the economy needs 250 gallons to keep rolling.

Fifteen gallons of water go into your Sunday newspaper. Your favorite television hour costs a few pennies worth of electricity, but 80 gallons of water are used to generate that electricity.

On your Sunday drive, you average two miles to each gallon of water used in making your gasoline.



Water for Paper

But nowhere in our life today is water more essential than in the pulp and paper industry. Paper cannot be made without water.

This fact means that The Crossett Company's paper mills require about 27 million gallons of water each day to produce 415 tons of kraft paper and 150 tons of bleached food board. It means that Crossett Paper Mills must have a steady source of water if production is to be maintained; it is just as certain that the mills must have a place to dispose of a like amount of waste water. To meet these realities, The Crossett Company devotes a great deal of time, money and effort.

The source for this 27 million gallons daily requirement is 21 company owned water wells located in two well fields within a few miles of the plants. The production of these wells range from 500 to 600 gallons per minute each for some of the "old" wells, which were brought in during the 1930's to provide water for the Kraft Paper Mill, to the 2,000 gallons per minute production each of seven new wells established with the advent of the new Bleached Food Board Mill. These wells are from 135 to 227 feet deep. Both fields draw on what experts call a "great reserve of water."

Water from these two fields is piped to Crossett Paper Mills where it is run through giant reservoirs that hold almost two million gallons. Water for the Kraft process goes into the mill just as it comes from the ground, but about 75 per cent of that used in the bleached board production is processed through a huge water softening plant.

ter softening plant.
Once in the mills, water is used principally to wash the unbleached and bleached pulps and as a carrying agent.

The Kraft Mill requires about 12 million gallons of water each day or about 30,000 gallons for each ton of paper produced. Forty thousand gallons are required in the bleaching process for each ton of food board. Daily requirements for the Board Mill are 15 million gallons or about 100,000 gallons for each ton of bleached food board produced.

To be more specific, the water demanded at the Kraft Mill, for example, is used in two principal ways. More than 30,000 gallons of water are used to wash and remove the spent cooking liquor,



This aerial view shows in detail the layout of The Crossett Company's new \$125,000 water impounding basin just completed on Coffee Creek. This basin, which will hold up to 625 million gallons of water, will provide an additional margin of safety in The Company's stream improvement program. To the right is the concrete spillway which will take care of overflow. Down the center can be seen the earth filled dam which stands about 20 feet high and 12 feet wide at the top. In the center of this dam are boxed culvert and gates to control the flow of water.

lignin and some cellulose from the eight tons of pine chips "cooked" into pulp in each digester batch. This washing is repeated on each of about 75 "cooks" a

Water is used as a carrying agent for pulp from this point until the wood fibers are joined together in strong enough bond to stand alone as paper.

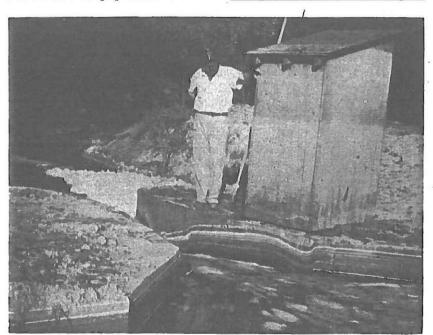
When pulp has been washed it is diluted to one part pulp and 99 parts water so that everything but the perfect single fibers can be screened out for the paper machines. Following this screening process water is removed from the pulp which is then transported to the paper machines. At the machines, the pulp is diluted again to a 99 to one consistency and carried into the Fourdrinier machines. Water is removed from the pulp mixture in succeeding manufacturing steps until the fibers are joined in the form of paper.

The same water is used over and over, but ultimately some 27 million gallons of soiled water must be discharged from the mills each day.

Meanwhile, The Crossett Chemical Company, Crossett Lumber Company and city of Crossett are also requiring more than three million gallons of water. Some one million gallons are discharged from The Chemical Company to be carried away with the effluent from the paper mills.

#### Disposal of Water

At this point, The Crossett Company's concern with the water it brings into its manufacturing plants is far from dismissed, for now must be faced the prob-



Mr. Sadler is checking one of several flumes built along Coffee Creek. At these flumes his specialists are able to measure the flow of water and secure samples for testing.



Samples collected from the river must be put in cold storage until tests are made to determine the amount of oxygen being de manded by organisms in the water.

lem of how and where to safely dispos of 27 million gallons of soiled water each day. The concern is now pollution con trol or stream improvement on the Ouschita River into which the disposal is made. It's a matter of river health,

The major problem in stream improve ment is the maintenance of a proper balance of oxygen in the water. The river, just as man, must have oxygen, but only in very small quantities when compared with our demand. A river in the best of health may contain no more than one pound of oxygen in 60 tons of water. By comparison, each of us inhales as much oxygen in a day as a million gallons of water contains. Actually, men live in an atmosphere in which one part in every five is oxygen, while a river's atmosphere has its free oxygen measured in parts per million.

The water discharged from The Crossett Company's plants carries suspended and dissolved materials which eat up large amounts of oxygen from the water. If water containing these materials should be dumped into the river with no thought to stream improvement, some of the oxygen would be used up, endangering the health of the river and ultimately aquatic life. The idea is to satisfy as much of the appetite of these materials for oxygen as possible before the water is released into the river.

#### The Answer

Fortunately, The Company has the answer in fast moving Coffee Creek that winds its way for 15 miles across the countryside before it finally enters the big Ouachita River; in man-made impounding basins, flumes and gates constructed along the creek's circuitous route, and in a staff of highly skilled scientists who practice the art of river

These extensive facilities have just been further improved with the construction of a new \$125,000 water hold-

(Please turn to Page 60)

## A Story of Water . . . (Continued from Page 54)



Jack W. Sadler, who heads a team of six stream improvement specialists for The Crossett Company, is shown adjusting the gates which control the flow of water out of Mossy Lake Into the Ouachita River.

ing basin. This basin, which was completed early this month, will hold up to 625 million gallons of water in a 264 acre site about three and one-half miles from the mills. Plans also call for a fiber settling pool about the size of a football field to be located nearby.

In announcing the construction of these new facilities, The Company said that its anti-stream pollution facilities, "provide more than adequate effluent disposal service for existing production installations," and that the new facilities were constructed "because we want to

assure the people of this area and ourselves of an additional margin of safety in our pollution control system."

The successful pollution control system works like this: The suspended materials which demand oxygen begin to settle out of the water just as soon as it leaves the mills. Almost all of the remaining materials leave the water in the first settling pool. The water is then allowed to flow into the impounding basin where it can be held up to 25 days. On the trip down Coffee Creek from the mills and in the basin the dissolved materials have had ample opportunity to feed on oxygen until almost all of the appetite is satisfied. Water is then released on a schedule determined by stream improvement specialists into Coffee Creek for the trip to Mossy Lake, a 175 acre holding basin near the Ouachita River which has been in operation since The Company first entered the pulp and paper business in 1937.

After further settling in Mossy Lake, the water is released into the river.

#### The River Doctors

The responsibility for the successful operation of this system is in the capable hands of scientists in The Company's Research Division. Six highly trained men under the direction of Jack W. Sadler, Research Chemist, conduct a running series of tests both on the river and in laboratories to determine the health of the water and to make certain that no materials released into the river can cause damage.

Three times a week, Mr. Sadler's crew makes a trip 29 miles down the broad, slow running river to Sterlington, La.,



River Doctor Jack W. Sadler is pictured making a test to determine the amount of oxygen in the water during one of the regular trips down the Ouachita River.

to probe the river and gather samples for intensive study back in the laboratories, These tests, which amount to a taking of the river pulse, are made about two miles apart all the way down to Sterlington. They consist of examinations made on the spot to determine the amount of oxygen in the water and tests conducted in the laboratories to ascertain the amount of oxygen being demanded by organisms in the water.

From these tests, the river doctors can determine the health of the river and how much water should be released from Mossy Lake. Findings are also supplied to federal and state authorities concerned with river health.

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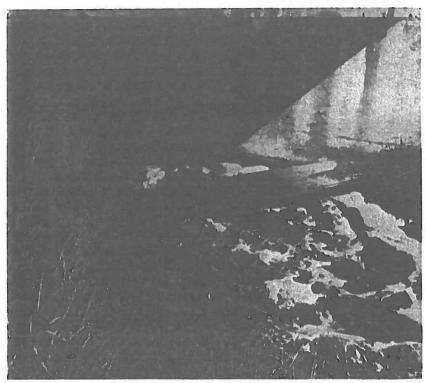
The Crossett Company concerns itself with more than the blessings and responsibilities of the best use of water in its own operating area. It has joined with the other paper producers of America to finance the progressive work of the National Council for Stream Improvement. This organization is devoted to the purpose of developing solutions to the industry's waste disposal and water utilization problems.

# Mississippi Pulp and Paper Co. Asks for Water Intake Permit

The Mississippi Pulp and Paper Co., of Columbus, Miss., has announced location of a \$30,000,000 plant near here last summer, and has now made application to the U. S. Corps of Engineers for a water intake structure on the Tombigbee River.

Application for a permit for the structure was made to the Mobile office, and calls for a structure on the east bank, at mean low water line and dredging an area 10 feet deep, fronting the structure.

The plant is to be located on the river between Columbus and the Air Force base, approximately six miles northeast of the city.



Some 12 million gallons of water are discharged from the Kraft Paper Mill through this gate each day. Stream improvement tests begin at this point.

# COFFEE CREEK -MOSSY LAKE USE ATTAINABILITY ANALYSIS

#### Section I- introduction

- A. Site Description
- B. Problem definition
- C. Approach to Use Attainability

# Section II- Analyses Conducted

- A. Physical Factors
  - 1. Coffee Creek
  - 2. Mossy Lake
- B. Chemical Factors
  - 1. Coffee Creek
  - 2. Mossy Lake
- C. Biological Factors
  - 1. Coffee Creek
  - 2. Mossy Lake

Section III- Findings

Section IV -Summary and Conclusions

#### SECTION I -INTRODUCTION

#### A. Site Description

Coffee Creek is a minor tributary of the Ouachita River with its headwaters originating within the City of Crossett, Arkansas. It meanders some 12 miles through Mossy Lake and one additional mile into the river near the Arkansas - Louisiana line. The creek area is heavily wooded with a mixture of pine and hardwood. The topography is nearly flat with only a gradual slope toward the river. The area is comprised of silty sedimentary soils with occasional deposits of clay/gravel bordering the creek lowlands.

The Mossy Lake/Coffee Creek System has been used as an integral part of the wastewater treatment system of the Georgia-Pacific manufacturing complex in Crossett, AR since the turn of the century. Additionally, effluent from the city of Crossett's wastewater treatment system is discharged through Coffee Creek and Mossy Lake. Since 1937 many modifications have been made by Georgia-Pacific to provide a wastewater treatment system including primary and secondary treatment. A chronology of these changes is provided below:

Year	Description
1937	Blasting to widen, straighten, and deepen creek.
1940's	Discharge gates and canal at Mossy Lake installed.
1950	Dams on Fish Slough at edge of Ouachita River installed to prevent river from changing course through Mossy Lake.
1950's	Dams on Slough connecting Cooly Lake and Mossy Lake installed to isolate Cooly Lake from the System.
1956	Stabilization basin (R-1) installed to upgrade wastewater treatment.
1956-57	Settling basins installed upstream of R-1 to reduce solids loading and improve treatment efficiency.
1963	Levee at Mossy Lake raised to 62' MSL to increase detention time of effluent and provide more efficient treatment.
1968	Primary clarifier and sludge storage basin installed adjacent to settling basins. Two separate parallel ditches from the mill to the clarifier installed. Mechanical aerators installed in R-1.
1968	Discharge gates replaced with new weir at Mossy Lake.
1970	A new channel from R-l to the abandoned railroad just upstream of Mossy Lake was installed. This channel is described in detail by the attached drawings.

A topographic map of the area indicating these changes is provided in Appendix I of this report. A smaller map showing the general layout of the system is provided in Figure I.

Mossy Lake and Coffee Creek are subject to annual flooding from the Ouachita River during the rainy season (typically November-June). Data from a typical year (1980) is summarized in Table I. Annual flood stages of the river from ~912-1955 indicate that the 62 foot MSL of Mossy Lake was exceeded in every year except one (1936). This flood stage data is provided in the bar graph. In addition, Table II illustrates the flood period from more recent years. The flow data from Mossy Lake is reported for all months from August 1979 through June 1985, where insignificant flooding occurred and flow measurements could be made. In all other months within this time period Mossy Lake was flooded (i.e., out of 70 months Mossy Lake was flooded approximately 43 months or over 60% of the time).

Coffee Creek between R-l and Mossy Lake in the absence of effluent is intermittent in nature. Runoff from the surrounding area southeast of the creek makes up the majority of the flow. While no direct measurements of f19f through Coffee Creek have been made, documentation of periods of zero flow is provided by two methods.

First the drainage area of Coffee creek is approximately 15 square miles. This area includes an approximately four square mile area draining through Indian Creek and a one square mile area located immediately north of Mossy Lake. By comparison, Moro Creek which is located approximately 50 miles north of Coffee Creek has a drainage area of 216 square miles. U.S.G.S. data (I) for this stream shows at least one month of zero flow for five consecutive years. Because of the much smaller drainage area of Coffee Creek and expected rain fall comparable to the Moro Creek area, it can be inferred that Coffee Creek also experiences extended periods of zero flow.

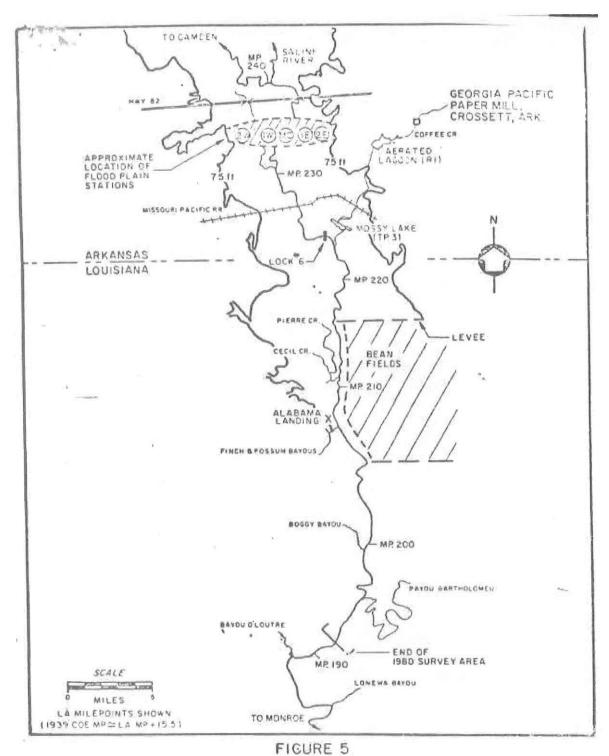
A second approach to confining the intermittent nature of Coffee Creek is to examine flow monitoring data from the outfall of R-l and outfall of Mossy Lake. Flow data is available for 27 months from August 1979 through June 1985, and is summarized in Table 4. Since effluent from the city and Georgia-Pacific and rainfall runoff are the only sources flowing into Mossy Lake, the average monthly flow excluding effluent in Coffee Creek can be easily be calculated. The Figure 4 data shows many periods of near zero flow in Coffee Creek. Therefore, the seven day ten year flow condition for Coffee Creek is zero.

(1) U.S.G.S. Open File Report 84-727.

#### B. Problem Definition

The following use classifications have been designated for Coffee Creek (including Mossy Lake):

- Industrial water supply.
- Agrlculiural water supply.



LOCATION OF FLOOD PLAIN SAMPLING STATIONS



Maxxam Job #: B160246 Report Date: 2011/06/03

**Environmental Science Corp** Client Project #: L513493

Your P.O. #: S14547

# DIOXINS AND FURANS BY HRMS (WATER)

Maxxam ID		JJ3514					- 1	
Sampling Date		2011/04/28 14:30						
COC Number		NA			TOXIC EQUIVA	LENCY	# of	
o o manipor	Units	L513493-01	EDL	RDL.	TEF (2005 WHO)	TEQ(DL)	somers	QC Batch
2,3,7,8-Tetra CDD *	pg/L	0.928 U	0.928	9.52	1.00	0.928		2502785
		1.58 U	1.58	47.6	1.00	1.58		2502785
1,2,3,7,8-Penta CDD	pg/L	1.25 U	1.25	47.6	0.100	0.125	-	2502785
1,2,3,4,7,8-Hexa CDD	pg/L	AMP TO SE	0.67(102)	47.6	0.100	0.123		2502785
1,2,3,6,7,8-Hexa CDD	pg/L	1.34 U	1.34	-	1000			
1,2,3,7,8,9-Hexa CDD	pg/L	1.28 U	1.28	47.6	0.100	0.128	-	2502785
1,2,3,4,6,7,8-Hepta CDD	pg/L	5.54 U (1)	5.54	47.6	0.0100	0.0554		2502785
Octa CDD	pg/L	79.6 J	1.19	95.2	0.000300	0.0239		2502785
Total Tetra CDD	pg/L	1.97 U (1)	1.97	9.52				2502785
Total Penta CDD	pg/L	1.58 U	1.58	47.6				2502785
Total Hexa CDD	pg/L	1.31 U	1.31	143				2502785
Total Hepta CDD	pg/L	9.66 U (1)	9.66	47.6	п			2502785
2,3,7,8-Tetra CDF **	pg/L	1.09 U	1.09	9.52	0.100	0.109		2502785
1,2,3,7,8-Penta CDF	pg/L	1.29 U	1.29	47.6	0.0300	0.0387		2502785
2,3,4,7,8-Penta CDF	pg/L	1.26 U (1)	1.26	47.6	0.300	0.378		2502785
1,2,3,4,7,8-Hexa CDF	pg/L	1.06 U	1.06	47.6	0.100	0.106		2502785
1,2,3,6,7,8-Hexa CDF	pg/L	1.12 U	1.12	47.6	0.100	0.112		2502785
2,3,4,6,7,8-Hexa CDF	pg/L	1.08 U	1.08	47.6	0.100	0.108		2502785
1,2,3,7,8,9-Hexa CDF	pg/L	1.13 U	1.13	47.6	0.100	0.113		2502785
1,2,3,4,6,7,8-Hepta CDF	pg/L	3.10 U (1)	3.10	47.6	0.0100	0.0310		2502785
1,2,3,4,7,8,9-Hepta CDF	pg/L	1.31 U (1)	1.31	47.6	0.0100	0.0131		2502785
Octa CDF	pg/L	2.72 J	1.20	95.2	0.000300	0.000816		2502785
Total Tetra CDF	pg/L	3.55 J	1.09	9.52	136			2502785
Total Penta CDF	pg/L	1.30 U (1)	1.30	95.2				2502785
Total Hexa CDF	pg/L	1.10 U	1.10	190				2502785
Total Hepta CDF	pg/L	3.13 U (1)	3.13	95.2				2502785
TOTAL TOXIC EQUIVALENCY	pg/L					3.98		
Surrogate Recovery (%)								
37CL4 2378 Tetra CDD	%	83						2502785

RDL = Reportable Detection Limit EDL = Estimated Detection Limit

QC Batch = Quality Control Batch
\* CDD = Chloro Dibenzo-p-Dioxin, \*\* CDF = Chloro Dibenzo-p-Furan
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,

The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested. WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

GBMC

January 26, 2016

Director
Office of Science Quality and Integrity (OSQI)
U.S. Geological Survey
MS 911 National Center
Reston, VA 20192

Re: Request for Correction of Information submitted under USGS Information Quality Guidelines GBMc No. 2064-15-500

#### Dear Sir or Madam:

On behalf of the Georgia Pacific Crossett LLC mill located in Crossett, Arkansas (GP) GBM<sup>c</sup> & Associates (GBM<sup>c</sup>) submits this information correction request to correct the location of Coffee Creek as shown on the following current United States Geological Survey (USGS) 7.5-Minute Series topographic maps:

- Crossett North, ARK
- · Crossett South, ARK-LA, and
- Felsenthal Dam, ARK-LA.

Included with this letter are three attachments, Attachment A is a USGS topographic map set, Attachment B is an aerial photograph map set, and Attachment C is a Geographic Information System (GIS) shapefile reference map. Attachments A and B (topos and aerials) depict the current locations of Coffee Creek and Coffee Creek Relief as they are shown above referenced USGS Quadrangle maps, and the actual location of Coffee Creek as it was delineated and mapped during this study.

#### **Existing USGS Topographic Map Conditions**

As currently shown on USGS topographical maps (i.e., the above referenced quadrangle maps), Coffee Creek originates on the GP mill site in Crossett, Arkansas, then flows west across Hwy 82, then flows southwest directly through the Mill's wastewater treatment system, highlighted in yellow on Attachments A and B. This depiction is inaccurate. This actually represents part of the mill's wastewater conveyance system from the mill and through the wastewater treatment system. A significant portion of this route from the mill site to the primary clarifier is piped and not in open channel conveyances.

# **Delineation and Mapping Investigation**

GP contracted GBM<sup>c</sup> to conduct a desktop analysis and field investigation to delineate and map the actual location of Coffee Creek in the vicinity of Crossett, Arkansas in Ashley County. A desktop analysis was completed to generally define the site(s), stream(s) and stream segments, and the accuracy of the current USGS topographic maps vs. aerials of the streams and stream segments to be mapped. The desktop analysis was completed using existing information



including lo cal topographic maps, current and historical aerial photographs, and available land ownership / parcel maps. Field investigations were then conducted to confirm the actual route of Coffee Creek.

On May 5<sup>th</sup> through 7<sup>th</sup>, 2015, GBM<sup>c</sup> conducted the first of two field investigations to delineate, document, and map the drainage pathway of Coffee Creek. The second trip was completed on August 18<sup>th</sup> through 19<sup>th</sup>, 2015. Conditions during both field trips were conducive for identifying, delineating, and mapping the main channel of Coffee Creek. The identification of the stream channel was based upon the presence of ordinary high water features (bed and banks) and on the definition of "Waters of the U.S." as defined in the Clean Water Act. Approximately 9.6 miles of Coffee Creek were field verified from the Ouachita River to Mossy Lake, and from the upper reaches of Mossy Lake near the old railroad tram up to where it crosses US Highway 278 in Crossett, AR (highlighted in blue on Attachments A and B). In addition to the main channel of Coffee Creek, several tributaries and storm water drainages were investigated (highlighted in pink on Attachments A and B) to ensure the most accurate delineation and mapping of Coffee Creek. GBM<sup>c</sup> personnel used a Trimble Geo 7X GPS with sub-meter accuracy to complete the mapping project.

## **Findings**

Following the desktop review and the field investigations conducted by GBMc, it has been determined that Coffee Creek's location as indicated on current USGS topographic maps is incorrect. Attachments A and B provide a visual representation of both the incorrect location presently shown on USGS topographic maps (yellow) and the correct delineated and mapped location of Coffee Creek (blue). Additionally, we have also included with this submittal a GIS shapefile of the correct delineated and mapped main channel of Coffee Creek. Attachment C provides the visual representation of this electronic file.

#### Recommendations

Based on the information provided herein and associated attachments, we request that all USGS topographic maps (and necessary databases) be updated as soon as practicable and corrected to reflect the actual Coffee Creek stream channel position.

If you have questions or need additional information, please contact Sarah Ross at the Georgia-Pacific mill in Crossett, Arkansas at (870) 567-8670. Thank you in advance for your assistance in this matter.

Sincerely,

**GBMc & ASSOCIATES** 

Travis Gasnier

**Environmental Scientist** 

Attachments



